# FOUR FORMS OF THE GENUS PARAPRIONOSPIO (POLYCHAETA : SPIONIDAE) FROM JAPAN

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# FOUR FORMS OF THE GENUS *PARAPRIONOSPIO* (POLYCHAETA: SPIONIDAE) FROM JAPAN

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*With Text-figures 1–6 and Table 1*

The spionid polychaete *Paraprionospio pinnata* was first recorded from off Chile by Ehlers (1901) as a species belonging to the genus *Prionospio*. Thereafter, this species has been reported from many parts of the world. Since the first record from Japan was made by Okuda (1937), this species has been also reported from various parts of Japan.

While examing the specimens collected from the western part of Wakasa Bay, the senior author (H.Y.) could instantly identify some of them as *P. pinnata* on the basis of the presence of conspicuous peristomial wings and three pairs of pinnate branchiae beginning on setiger 1 (Yokoyama and Hayashi, 1980). However, later closer examinations revealed that there were three distinct forms among the specimens reported as *P. pinnata*. Further, these three forms and an additional form were found to be widely distributed in the Japanese waters. One of these four forms (Form A in this paper) was already noted by listing several diagnostic characters as a form in *P. pinnata*, and its larval development was described (Yokoyama, 1981). On the other hand, the junior author (K.T.) also independently came to notice the presence of the same four forms, and recorded them from several parts of western Japan with describing briefly the morphological differences between them (Tamai, 1981).

Foster (1969, 1971) synonymized eight taxa with *P. pinnata* and stated that this species was monotypic. However, Fauchald (1972) considered that *P. africana* (Augener, 1918), *P. alata* (Moore, 1923) and *P. treadwelli* (Hartman, 1951) should be accepted as a valid species respectively. Later, *P. alata* was synonymized again with *P. pinnata* by Light (1978), while Hartman (1974) described a new *Paraprionospio* species, *P. lamellibranchia*. Therefore, the genus *Paraprionospio* now comprises four species, *P. pinnata*, *P. africana*, *P. treadwelli* and *P. lamellibranchia*.

As will be discussed later, the differences among the four forms of the present specimens may be taken as those that suffice to discriminate them as a distinct species

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respectively. However, the characters treated in the present study have been almost ignored in the previous descriptions of the *Paraprionospio* species. Since there is no relevant information on these characters of the type specimens of the *Paraprionospio* species, it should be left unsolved to determine the attributions of the present forms to the former species. In this paper, the descripions are given for these four forms without referring them to separate definite species.

Before going further, we would like to express our gratitude to Prof. Eiji Harada of the Seto Marine Biological Laboratory for his kindness in reading the manuscript. Sincere thanks are also due to Dr. Minoru Imajima of National Science Museum and Dr. Izumi Nakamura of Kyoto University for their encouragement and helpful advice. We are grateful to Mr. Isao Hayashi of Kyoto University, Mr. Ryohei Yamanishi of the Osaka Museum of Natural History, Mr. Susumu Yamochi of Osaka Prefectural Fisheries Experimental Station and Mr. Jun Takahashi of Ibaragi Fisheries Experimental Station, for their kindness in allowing us to examine their collection. Our gratitude is also expressed to Dr. John H. Day of University of Cape Town, who generously taught us the characters of his South African specimens. Dr. Daniel M. Dauel of Old Dominion University and Dr. M. Imajima made some literatures available to us, to whom we are indebted.

## Descriptions of Four Forms of *Paraprionospio*

***Form A*** (Figs. 2 & 3)

Material examined: More than three thousand specimens collected from the following localities. Hitachi Harbor, Ibaragi Pref., Ibaragi Fisheries Experimental Station coll.; Nagoya Bay, H. Yokoyama coll.; Tsuruga Bay, 11–20 m deep, I. Hayashi coll.; Obama Bay, 3–13 m deep, I. Hayashi coll.; Maizuru Bay, 6 m deep, I. Hayashi coll.; off Yura River, Wakasa Bay, 3–40 m deep, H. Yokoyama coll.; Kumihama Bay, 2–12 m deep, H. Yokoyama coll.; off Sendai River, Tottori Pref., 9–16 m deep, H. Yokoyama coll.; Tanabe Bay, 6–13 m, H. Yokoyama coll.; Wakayama Harbor, Wakayama Pref., 9 m deep, H. Yokoyama coll.; off Onosato, Osaka Bay, 4–15 m deep, S. Yamochi coll.; off Kobe, Osaka Bay, 6–20 m deep, R. Yamanishi coll.; Osaka Bay, 7–20 m deep, K. Tamai coll.; off Kakogawa, Hyogo Pref., H. Yokoyama coll.; Mega Harbor, Hyogo Pref., H. Yokoyama coll.; Tosa Bay, 10–25 m deep, K. Tamai coll.

Description: The body is up to 81 mm in length. The greatest number of setigers is 114 (Fig. 1).

The anterior margin of the prostomium varies in shape from bluntly pointed to round or truncate (Fig. 2, a). In most specimens examined, two pairs of black eyes are found on the prostomium; the anterior pair are more or less inconspicuous and further apart; the eyes of the posterior pair lie closer together. A raised, narrow ridge is recognized on the posterior region of the prostomium. The palpi are ventrally grooved and dorsally serrated; there are spotted brown pigments along the outer sides of the palpal groove. A conspicuous sheath is present at the base of the

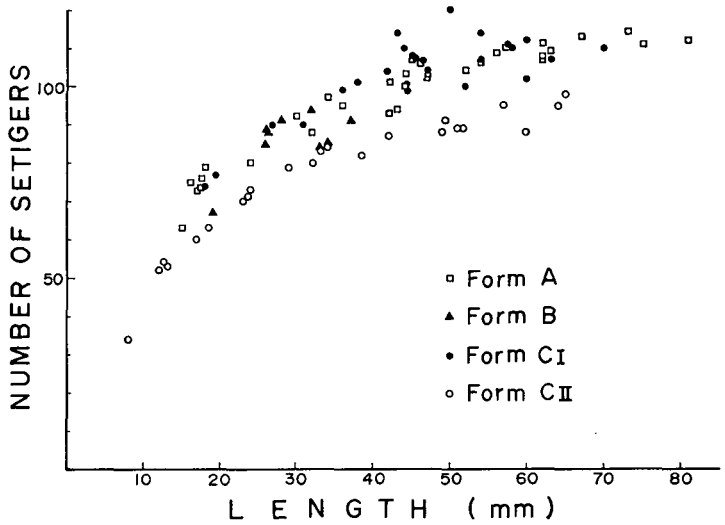



Fig. 1. Relationship between the number of setigers and the body length in four forms of *Paraprionospio*. The specimens measured were shrunk by formalin.

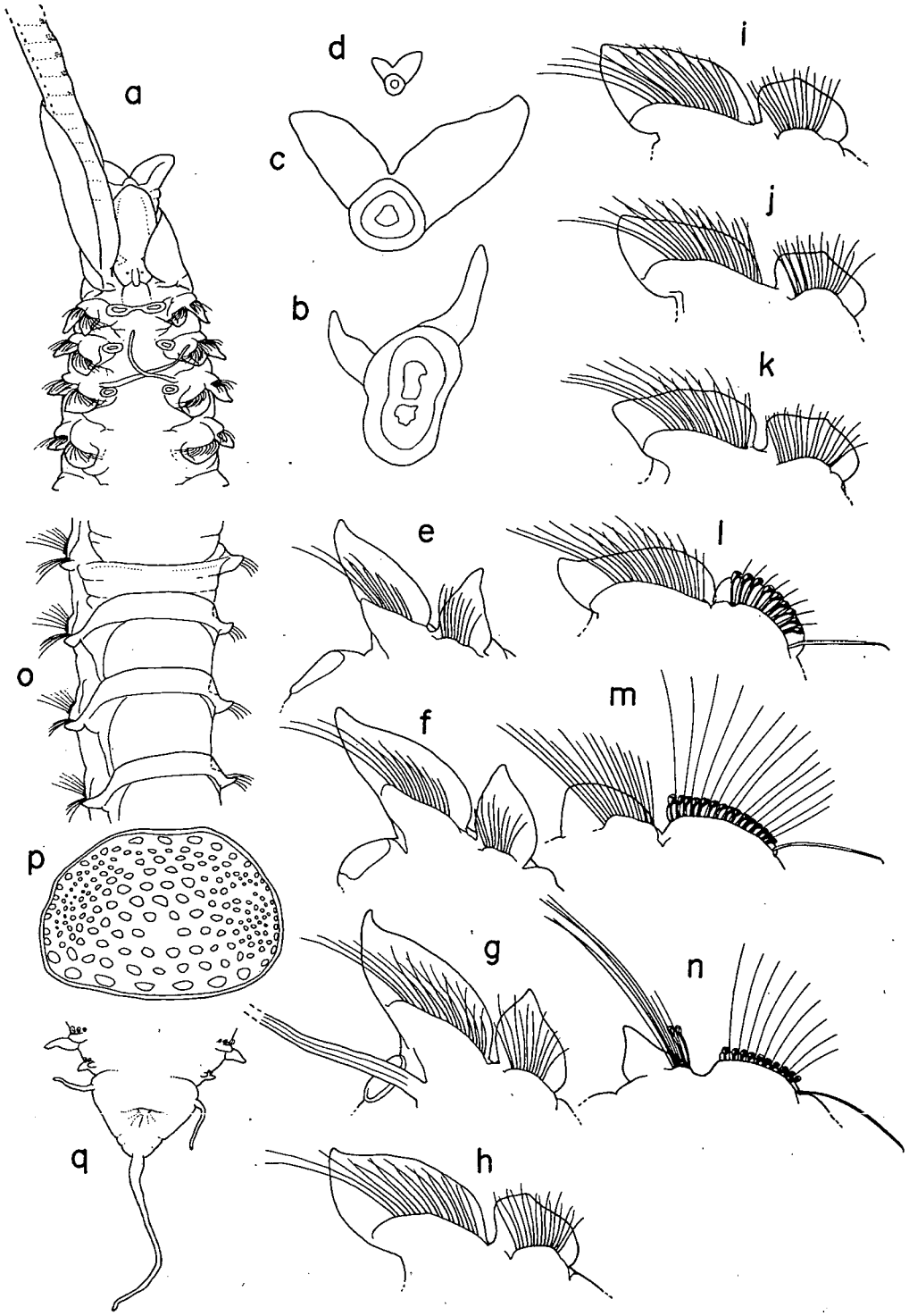
palp. The peristomium is enlarged as a pair of membranous wings enclosing the sides of the prostomium. There is a small papilla on the posterior margin of the peristomial wing.

When everted, the proboscis appears as a bilobed process (Fig. 2, a). The oesophagus which has strongly developed walls is present in setigers 9–10.

A pair of pinnate branchiae are present on the first three setigers. When not regenerating, the first pair of branchiae is longest and each has more than 50 pairs of lamellar plates which are attached serially on the inner to posterior face of the shaft in two rows; usually, the third pair of branchiae is shortest. In the proximal part of the branchia the lamellar plates are slender and are kept separate one from the other (Fig. 2, b); toward the tip they become broader and touching each other at their bases (Fig. 2, c, d). In the formalin-fixed specimens, the branchial lamellae come close together, however in spirit, the branchiae are very elongate with the lamellae widely separated. There is a dorsal ridge connecting the bases of the first pair of branchiae (Fig. 2, a). A slender filament arises at the base of each of the third pair of branchiae (Fig. 2, a, g); its length is variable.

The postsetal lamellae of anterior parapodia are well developed (Fig. 2, e,f,g); the notopodial lamellae are lanceolate, distally pointed, and larger than the corresponding neuropodial lamellae, which are subtriangular. Posterior to setiger 4, the parapodia lie more ventro-laterally; both the noto- and neuropodial lamellae become increasingly rounded, reducing in size (Fig. 2, h, i, j, k, l). Posteriorly, the notopodial lamellae become again acuminate, while the neuropodial lamellae are reduced as a mere low ridge (Fig. 2, m, n).

The anterior setae are all capillaries (Fig. 3, a); they are bilimbate, and bear granules. 12 to 15 neuropodial hooded hooks (Fig. 3, b) appear from setiger 9, accompanied by alternating capillaries and one to two sabre-setae (Fig. 3, c). The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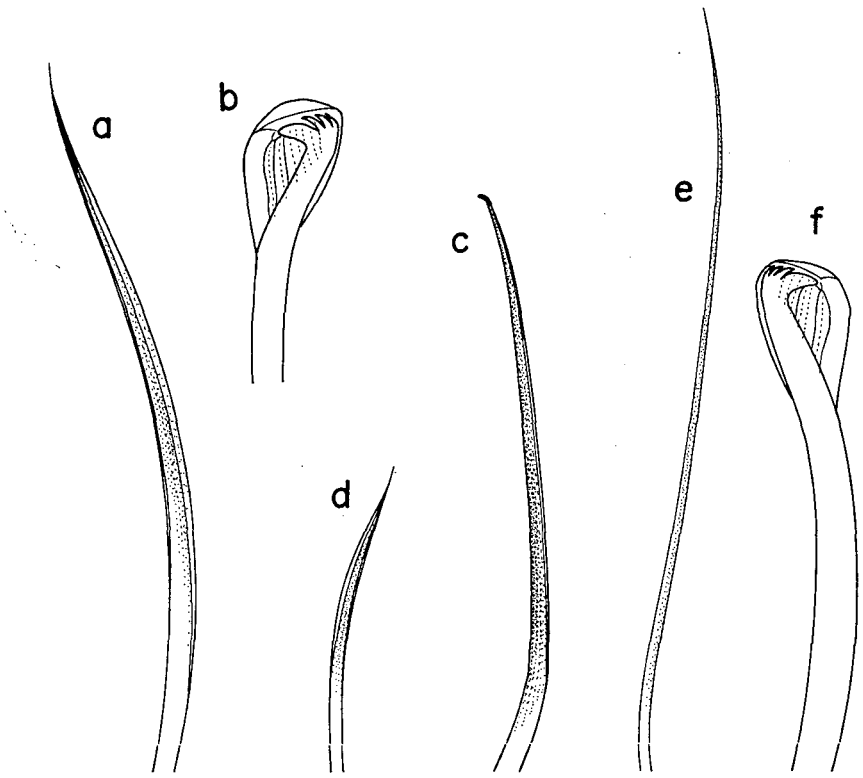
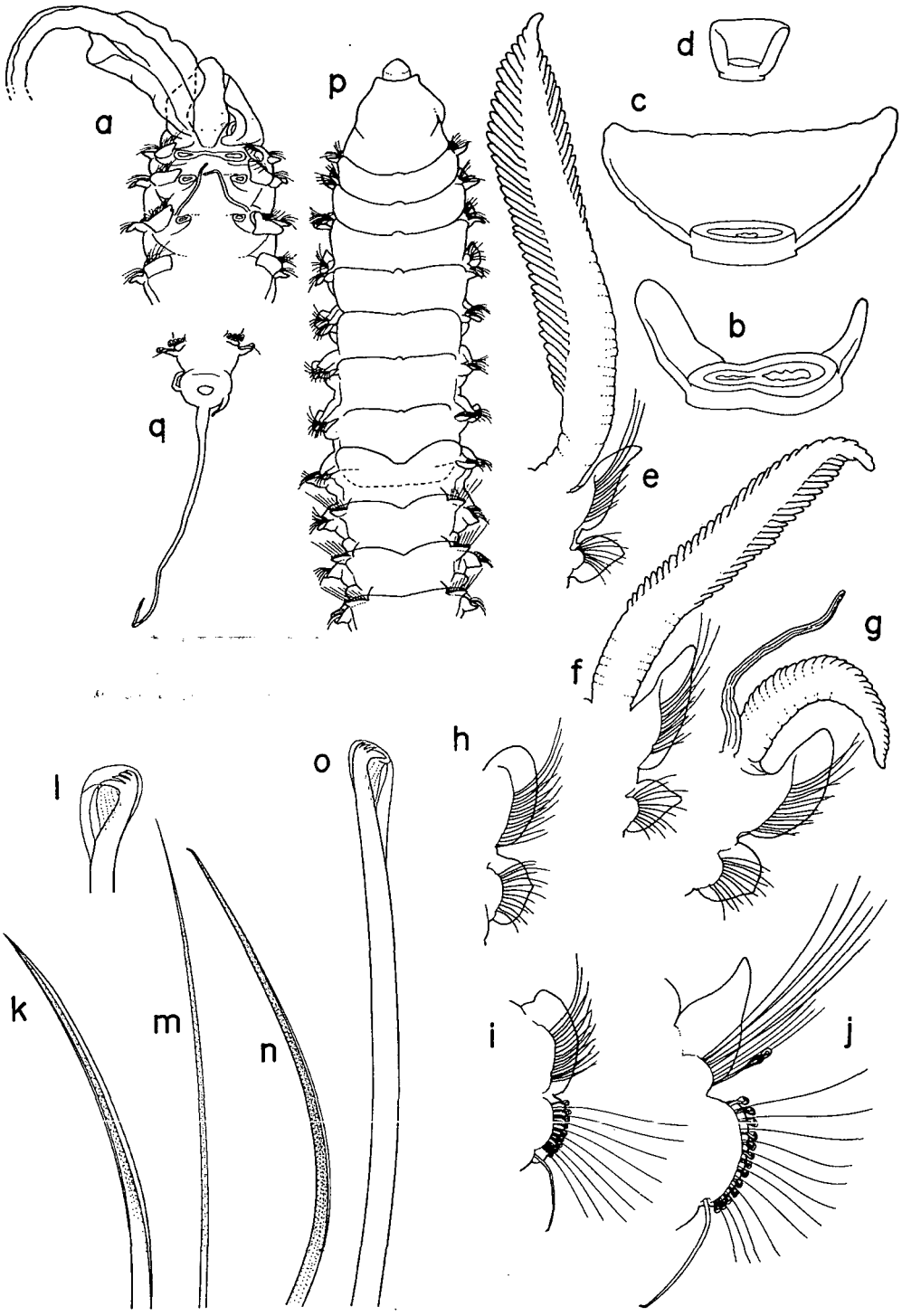



Fig. 3. Setae of Form A. a, notopodial limbate capillary of 3rd parapodium, ×262; b, neuropodial hooded hook of 10th parapodium, ×527; c, Sabre-seta of 9th parapodium, ×178,; d, neuropodial limbate capillary of 9th parapodium, ×262; e, neuropodial nonlimbate capillary of 10th parapodium, ×262; f, notopodial hooded hook of 48th parapodium, ×527.

neuropodial capillaries of setiger 9 are of the same type as those in the anterior neuropodia, though they are comparatively short and fine (Fig. 3, d). Posterior to setiger 10 neuropodial capillaries are replaced by long, fine, nonlimbate capillaries (Fig. 3, e). The notopodial hooded hooks (Fig. 3, f) are present in the parapodia posterior to setigers 31–36 (usually setiger 35). The hooks of both rami have six small teeth in two rows above the main fang. Posterior to the middle body region, notopodial limbate capillaries become gradually replaced by slender, nonlimbate capillaries.

Fig. 2. Form A. a, anterior end with the base of left palp and everted proboscis, in dorsal view, right palp and branchiae removed, ×18; b, proximal part of left branchia of setiger 1 in cross section, showing branchial lamella, seen from top, ×70; c, middle part of the same branchia in cross section, seen from top, ×70; d, distal part of the same branchia in cross section, seen from top, ×70; e, 1st parapodium, in anterior view, ×54; f, 2nd parapodium, in anterior view, ×54; g, 3rd parapodium with the base of filament, in anterior view, ×54; h, 4th parapodium, in anterior view, ×54; i, 5th parapodium, in anterior view, ×54; j, 6th parapodium, in anterior view, ×54; k, 8th parapodium, in anterior view, ×54; l, 9th parapodium, in anterior view, ×54; m, 20th parapodium, in anterior view, ×54; n, 48th parapodium, in anterior view, ×54; o, setigers 20–23, showing dorsal crests, in dorso-lateral view, ×18; p, dorsal cuticle of setiger 21, showing concavities, ×36; q, posterior end, in ventral view, ×54.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On setigers 21–35, both the notopodial lamellae are united dorsally to form membranous crests (Fig. 2, o). Among the specimens examined, only one specimen collected from Hitachi Harbor, the northernmost locality in the collection, bears these dorsal crests on setigers 21–36. Accompanied by these dorsal crests, thin, transparent cuticle bearing many circular concavities is noticeable on the dorsal surface (Fig. 2, o, p); it has often exfoliated in ill-preserved specimens. Interramal pouches are entirely absent. The pygidium bears a long, median cirrus and two short, lateral anal cirri (Fig. 2, q).

***Form B*** (Fig. 4)

Material examined: 873 specimens collected from the following localities. Tsuruga Bay, 17–31 m deep, I. Hayashi coll.; Obama Bay, 4–26 m deep, I. Hayashi coll.; Maizuru Bay, 6–26 m deep, I. Hayashi coll.; off Yura River, Wakasa Bay, 20–40 m deep, H. Yokoyama coll.; Kii Channel, 20–42 m deep, K. Tamai coll.; off Tanagawa, Osaka Bay, 8–13 m deep, H. Yokoyama coll.; off Kobe, Osaka Bay, 17 m deep, R. Yamanishi coll.; Osaka Bay, 14–51 m deep, K. Tamai coll.; Sumoto Harbor, Awaji Island, 12–26 m deep, H. Yokoyama coll.; off Kakogawa, Hyogo Pref., 5–14 m deep, H. Yokoyama coll.; Hiuchi-Nada, Seto Inland Sea, 10–26 m deep, K. Tamai coll.; Tosa Bay, 45 m deep, K. Tamai coll.; Beppu Bay, 7–54 m deep, K. Tamai coll.; Ariake Sea, 3 m deep, H. Yokoyama coll.; East China Sea, 70 m deep, K. Tamai coll.

Description: The body is up to 37 mm in length. The greatest number of setigers is 94. The size at maturity is comparatively smaller than those of other forms treated here (Fig. 1).

The prostomium is fusiform with round anterior end (Fig. 4, a). Two pairs of black, small eyes are usually visible; the anterior eyes are wide apart, while the posterior ones are closer together. A pair of yellowish-brown pigment patches are occasionally found between the two pairs of eyes. The palpi are ventrally grooved. A membranous sheath is present on the base of the palp. There are no papillae at the posterior margins of the peristomial wings, which enfold the prostomium.

The proboscis is bilobed. The muscular oesophagus is situated generally in setigers 7–9.

A pair of branchiae are present on setigers 1–3; usually, the first pair is longest and the third pair is shortest. Lamellae are attached serially on the inner to

Fig. 4. Form B. a, anterior end, in dorsal view, right palp and branchiae removed, ×28; b, proximal part of left branchia of setiger 1 in cross section, showing branchial lamella, seen from the side, ×131; c, middle part of the same branchia in cross section, seen from the side, ×131; d, distal part of the same branchia in cross section, seen from the side, ×131; e, 1st parapodium with branchia, in anterior view, ×54; f, 2nd parapodium with branchia, in anterior view, ×54; g, 3rd parapodium with branchia and filament, in anterior view, ×54; h, 5th parapodium, in anterior view, ×54; i. 9th parapodium, in anterior view, ×54; j, 48th parapodium, in anterior view, ×90; k, notopodial limbate capillary of 3rd parapodium, ×262; l, neuropodial hooded hook of 47th parapodium, ×527; m, neuropodial nonlimbate capillary of 9th parapodium, ×262; n, sabre-seta of 9th parapodium, ×262; o, notopodial hooded hook of 61th parapodium, ×527; p, anterior end, in ventral view, showing the bilobed ridge in setiger 8, ×28; q. posterior end, in ventral view, ×28.

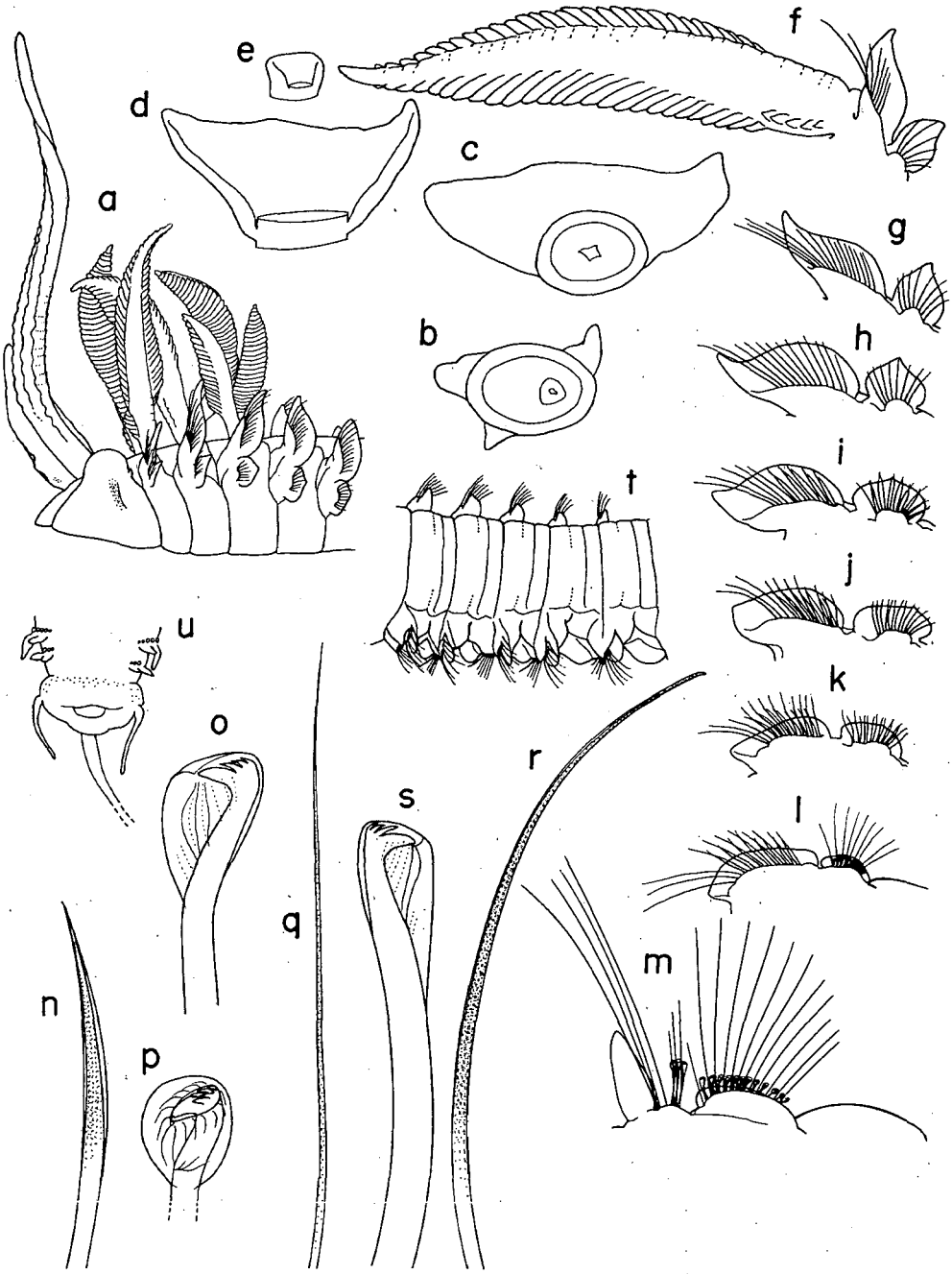



Fig. 5. Form CI. a, anterior end, in lateral view, left palp removed, pigments shown by stippling, ×15; b, proximal part of left branchia of setiger 1 in cross section, showing two lamellar plates and a accessory lamella, seen from top, ×54; c, middle part of the same branchia in cross section, seen from top, ×54; d, the same, seen from the side, ×54; e, distal part of the same branchia in cross section, seen from the side, ×54; f, 1st parapodium with branchia, in anterior view, ×29; g, 2nd parapodium, in anterior view, ×29; h, 3rd parapodium, in anterior view,

posterior face of the branchial shaft; in the proximal part of the branchia the lamella consists of two distinct plates (Fig. 4, b); in the middle to distal part two plates are completely united and the lamellae look flabellate in shape (Fig. 4, c, d). There is a dorsal ridge connecting the two branchial bases on setiger 1 (Fig. 4, a). A slender filament arises from the anterior base of the third branchia (Fig. 4, a, g).

The anterior notopodial lamellae are long, distally tapered and larger than the neuropodial lamellae, which are ovate (Fig. 4, e, f, g). Posterior to setiger 4 both the noto- and neuropodial lamellae become more round and low (Fig. 4, h). In general, the notopodial lamella of setiger 9 is most flattened (Fig. 4, i). Posteriorly the notopodial lamella increases gradually in its height, then becomes subtriangular to lanceolate in shape, while the neuropodial lamella is reduced to be a very low, flattened ridge (Fig. 4, j).

The anterior noto- and neuropodial setae are all bilimbate capillaries, which bear granules along the shaft (Fig. 4, k). Neuropodial hooded hooks appear from setiger 9, accompanied by alternating capillaries (Fig. 4, m) and one to two sabre-setae (Fig. 4, n). The alternating capillaries of setiger 9 and the succeeding setigers are without limbation. Notopodial hooded hooks (Fig. 4, o) are present in the parapodia posterior to setigers 36–42; they are considerably longer than the neuropodial hooks and the setal head is smaller in proportion to the shaft. Both the noto- and neuropodial hooks have three paired small teeth above the main fang. The hood of the hook is heavily striated.

In the majority of specimens, interramal pouches are found (Fig. 4, p); they occur usually from setiger 9, occasionally from setiger 8 or setiger 10, through variable number of setigers (up to setiger 42). On the ventrum of setiger 8, there is a conspicuous, bilobed ridge (Fig. 4, p); it projects forward and forms a pocket-like structure; on the two to three succeeding setigers, anterior margins of the ventrum project slightly, but never form such a conspicuous pouch. On setigers 21–36, the dorsum is coated with thin, transparent cuticle bearing many circular concavities; the cuticle is easy to exfoliate from each segment in ill-preserved specimens. Distinct dorsal crests such as those observed in Form A are not found. The pygidium bears a long median cirrus and two short lateral ones (Fig. 4, q).

***Form CI*** (Fig. 5)

Material examined: 616 specimens collected from the following localities. Off Tokai, Ibaragi Pref., 15–18 m deep, Ibaragi Fisheries Experimental Station coll.; Tsuruga Bay, 15–43 m deep, I. Hayashi coll.; Obama Bay, 14 m deep, I. Hayashi coll.; Maizuru Bay, 13–17 m deep, I. Hayashi coll.; off Takahama, Wakasa

×29; i, 4th parapodium, in anterior view, ×29; j, 5th parapodium, in anterior view, ×29; k, 8th parapodium, in anterior view, ×29; l, 9th parapodium, in anterior view, ×29; m, 46th parapodium, in anterior view, ×54; n, neuropodial limbate capillary of 4th parapodium, ×262; o, neuropodial hooded hook of 9th parapodium, in lateral view, ×527; p, the same, in three-quarter view, ×527; q, neuropodial nonlimbate capillary of 9th parapodium, ×262; r, sabre-seta of 46th parapodium, ×262; s, notopodial hooded hook of 46th parapodium, ×527; t, setigers 8–12, in dorso-lateral view, showing interramal pouches, ×15; u, posterior end, in ventral view, ×36.

Bay, 24–59 m deep, H. Yokoyama coll.; off Yura River, Wakasa Bay, 3–60 m deep, H. Yokoyama coll.; Tanabe Bay, 23–34 m deep, H. Yokoyama coll.; Osaka Bay, 15–64 m deep, K. Tamai coll.; Kii Channel, 38–67 m deep, K. Tamai coll.; Yawatahama Harbor, Ehime Pref., 18 m deep, H. Yokoyama coll.; Tosa Bay, 15–110 m deep, K. Tamai coll.; Beppu Bay, 8–60 m deep, K. Tamai coll.; Usuki Bay, 18 m deep, H. Yokoyama coll.; off Sendai, Kagoshima Pref., 25 m deep, H. Yokoyama coll.; East China Sea, 52 m deep, K. Tamai coll.

Description: The body is up to 70 mm in length. The greatest number of setigers is 120 (Fig. 1).

The prostomium is fusiform with round or bluntly pointed anterior end, extending posteriorly as a faintly raised ridge to the first setiger (Fig. 5, a). Two pairs of black eyes in trapezoidal arrangement are usually found through the cuticle of the prostomium. The palpi are ventrally grooved. On the outer side of the basal sheath of the palp, a brown pigment patch is occasionally found. The peristomium is elevated dorsally and forms the lateral wings which enfold the prostomium. In most specimens, a brown pigment patch is found on the lateral side of the peristomium; in a few specimens examined, however, such pigmentation is hardly visible. Just posterior to this pigmented area, a faint groove is found. There is a small papilla on the posterior margin of the peristomial wing.

The proboscis is bilobed. The muscular oesophagus is located generally in setigers 7–8.

A pair of branchiae are present on setigers 1–3 (Fig. 5, a); usually, the first pair is longest and the third is shortest. In the proximal part of the branchia, the lamella consists of two plates (Fig. 5, b), but in other parts, the two plates are united completely and the lamellae look flabellate (Fig. 5, c,d,e). Several triangular lamellae are placed along the anterior face of the first branchial shaft on its basal part (Fig. 5, a,b,f). There is a transverse dorsal ridge between the bases of the first branchiae. There is no slender filament at the base of the third branchia, but a very small protuberance is occasionally found there.

The anterior notopodial lamellae are long, foliaceous and distally pointed; the neuropodial lamellae are ovate, distally pointed (Fig. 5, f,g,h). Posterior to setiger 4 both the noto- and neuropodial lamellae become gradually rounded (Fig. 5, i,j,k,l). Posterior to setiger 10, the notopodial lamellae are increasingly elevated, while the neuropodial lamellae are reduced as a low ridge (Fig. 5, m).

The anterior setae are all bilimbate capillaries (Fig. 5, n). Neuropodial hooded hooks (Fig. 5, o,p) appear from setiger 9, together with slender, alternating capillaries (Fig. 5, q) and one to two sabre-setae (Fig. 5, r). The alternating capillaries of setiger 9 and succeeding setigers are without obvious limbation. Notopodial hooded hooks (Fig. 5, s) are present in the parapodia posterior to setigers 24–54. The hooks of both rami have six small teeth in two rows above the main fang (Fig. 5, p). The hood of the hook is heavily striated. Posterior about to setiger 16, notopodial limbate capillaries become gradually replaced by slender, nonlimbate capillaries.

The anterior segments are faintly annulated and bear two ciliated bands on the

dorsum. Transparent dorsal cuticle is not found. Interramal pouches are present in some of specimens (Fig. 5, t); if present, they occur usually from setiger 8 (occasionally from setiger 7 or setiger 9), through variable number of setigers. The pygidium is provided with a long median cirrus and two short, lateral ones (Fig. 5, u). Yellowish-brown pigments are occasionally found on the pygidium.

***Form CII*** (Fig. 6)

Material examined: 198 specimens collected from the following localities. Off Takahama, Wakasa Bay, 37–60 m deep, H. Yokoyama coll.; Tanabe Bay, 59 m deep, H. Yokoyama coll.; Tosa Bay, 25–98 m deep, K. Tamai coll.

Description: The body is up to 65 mm in length and consists of 98 setigers (Fig. 1).

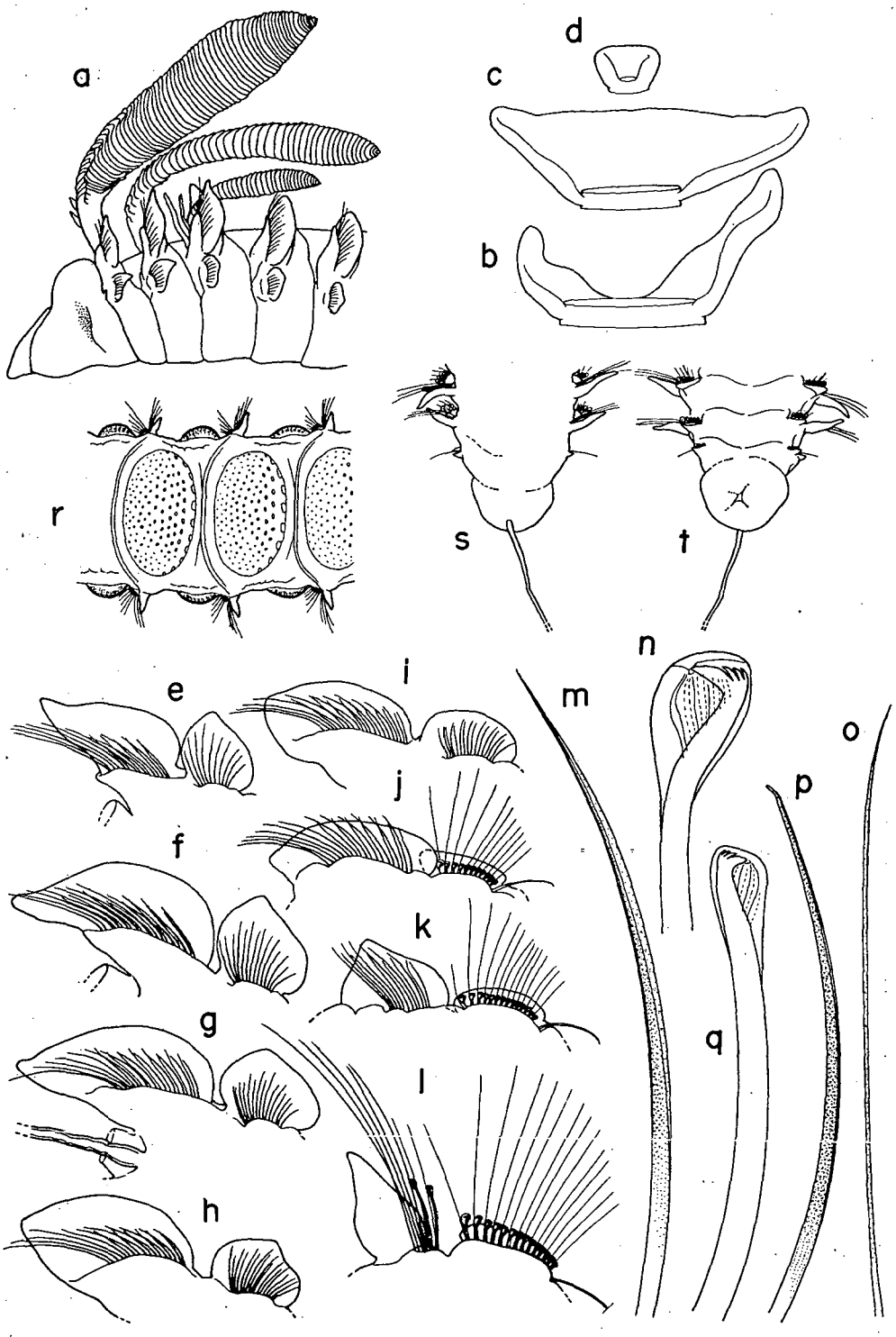
The prostomium is fusiform with round or bluntly pointed end (Fig. 6, a). A slightly raised ridge is recognized on the posterior region of the prostomium. Two pairs of small, dark-brown eyes are usually visible through the cuticle of the prostomium; the anterior eyes are inconspicuous, sometimes not visible, and are wide apart, while the posterior ones are situated closer together. The palpi are present, but extremely deciduous and very often missing; they are ventrally grooved and have a basal sheath. There are enlarged peristomial wings, which enfold the prostomium. A brown pigment patch is usually observed on the lateral side of the peristomium. A faint groove is present at the posterior part of this pigmented area. A small papilla is present on the posterior margin of the peristomial wing.

The proboscis is bilobed. The muscular oesophagus is located usually in setigers 6–8.

One pair of branchiae are present on setigers 1–3 (Fig. 6, a); usually, the first pair is longest and the third is shortest. In the proximal part of the branchia, each lamella consists of two plates (Fig. 6, b); in the middle to distal part, two plates are united together and the lamellae look flabellate (Fig. 6, c,d). One to five triangular accessory lamellae are present along the anterior face of the first branchial shaft on its basal part (Fig. 6, a). There is a transverse dorsal ridge connecting the bases of the first branchiae. A slender filament is observed at the anterior base of the third branchia (Fig. 6, a,g).

The anterior notopodial lamellae are well-developed and look lanceolate with a distally tapered end (Fig. 6, e,f,g). Posterior to setiger 4, notopodial lamellae are gradually reduced in size and become rounded (Fig. 6, h,i,j). Again, these lamellae become blade-like in shape posteriorly (Fig. 6, k,l). The anterior neuropodial lamellae are ovate. Posterior to setiger 4, the neuropodial lamellae become rounded and low.

The anterior setae of both rami are all bilimbate capillaries and bear granules (Fig. 6, m). Neuropodial hooded hooks (Fig. 6, n) are present in the parapodia posterior to setiger 9, together with slender alternating capillaries (Fig. 6, o) and one to two sabre-setae (Fig. 6, p). The alternating capillaries of setiger 9 and the succeeding setigers are without limbation. Notopodial hooded hooks (Fig. 6, q) are present in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the parapodia posterior to setigers 34–42. Both the noto- and neuropodial hooks have six small teeth in two rows above the main fang and heavily striated hoods.

On setigers 21–31, transparent dorsal cuticle, bearing many concavities, is present (Fig. 6, r). Dorsal crests between the notopodia are not observed. Interramal pouches, bearing striae inside, are present; the anterior-most setiger furnished with the pouches varies from setiger 4 to setiger 15. A long anal cirrus is present dorsally on the pygidium, however, lateral anal cirri are not found (Fig. 6, s,t).

## Discussion

The present specimens, which are evidently referable to the genus *Paraprionospio*, can be separated into four forms by several consistent characters listed in Table 1. Among these four forms, Form CI and Form CII are more closely related each other. However, the former can be separated from the latter by the absence of a filament on setiger 3 and the transparent dorsal cuticle and the presence of the lateral anal cirri. Form A is characterized by the possession of the bifoliate branchial lamella, the limbate capillaries in neuropodium 9 and the dorsal crests on setigers 21–35. Form B is distinguishable from other forms not only by the presence of the bilobed ventral ridge on setiger 8 but also by its smaller size at maturity. These differences among the four forms of specimens may be taken as being of a specific significance.

Hartman (1974) reported *Paraprionospio lamellibranchia* from the Indian Ocean, whose branchial lamella was bifoliate, similarly to Form A of our specimens. She described that each branchial lamella was penetrated by three vascular loops, and that interramal pouches were present in some of her specimens. In Form A, the branchial lamella are provided with a more complex, reticulated vascular tract instead with three vascular loops, and interramal pouches are entirely absent in all the specimens examined.

According to the personal communication from Dr. J.H. Day, the branchial lamellae of his South African specimens identified as *P. pinnata* by himself (Day, 1967) are bifoliate. He also stated that his specimens lacked the interramal pouches and bore a dorsal crest on setigers 21–30. Such features suggest the closest relationship between the South African specimens and our Form A, although the number of the dorsal crests of the South African specimens differs slightly from that of our

Fig. 6. Form CII. a, anterior end, in lateral view, palpi and left branchiae removed, ×15; b, proximal part of right branchia of setiger 1 in cross section, showing branchial lamella, seen from the side, ×54; c, middle part of the same branchia in cross section, seen from the side, ×54; d, distal part of the same branchia in cross section, seen from the side, ×54; e, 1st parapodium, in anterior view, ×36; f, 2nd parapodium, in anterior view, ×36; g, 3rd parapodium with the base of filament, in anterior view, ×36; h, 4th parapodium, in anterior view, ×36; i, 5th parapodium, in anterior view, ×36; j, 9th parapodium, in anterior view, ×36; k, 16th parapodium, in anterior view, ×36; l, 64th parapodium, in anterior view, ×54; m, notopodial limbate capillary of 4th parapodium, ×262; n, neuropodial hooded hook of 9th parapodium, ×527, o, neuropodial nonlimbate capillary of 9th parapodium, ×262; p, sabre-seta of 16th parapodium, ×262; q, notopodial hooded hook of 57th parapodium, ×359; r, setigers 21–23, in dorsal view, showing transparent dorsal cuticle and interramal pouches, ×15; s, posterior end, in dorsal view, ×23; t, posterior end, in ventral view, ×23.

Table 1. Comparison of four forms of the genus *Paraprionospio*

| Characters | Form A | Form B | Form CI | Form CII |
|---|---|---|---|---|
| Pigment spots on the peristomium | absent | absent | present | present |
| Papilla on the posterior margin of the peristomium | present | absent | present | present |
| Shape of the lamellar plate of the branchia | bifoliate | flabellate | flabellate | flabellate |
| Accessory lamellae on the first branchia | absent | absent | present | present |
| Filament at the base of the third branchia | present | present | absent | present |
| First appearance of nonlimbate capillaries in neuropodia | setiger 10 | setiger 9 | setiger 9 | setiger 9 |
| Ventral bilobed ridge on setiger 8 | absent | present | absent | absent |
| Transverse dorsal crests between the notopodia | present on setigers 21–35 | absent | absent | absent |
| Transparent dorsal cuticle | present on setigers 21–35 | present on setigers 21–36 | absent | present on setigers 21–31 |
| Interramal pouches | absent | usually present | present or absent | present |
| Lateral anal cirri | present | present | present | absent |

Form A. However, his South African specimens are readily separated from our Form A in lacking the filament of setiger 3.

Foster (1969, 1971) described the specimens mainly collected from the Gulf of Mexico and the Carribean Sea as a species belonging to *P. pinnata*. Her figures (1971, p. 177) clearly show that the branchial lamellae are flabellate except in the proximal part of the branchia, where they are bifoliate. Such feature of the branchial lamellae differentiates the American specimens from the South African specimens, though both of them were reported as *P. pinnata*.

Doubts as to the identification of *P. pinnata* have been already expressed by Fauchald (1972). He suggested that animals bearing a filament on setiger 3 should be excluded from *P. pinnata*. However, he did not refer to the other problematic characters found in the present study. Indeed, the original descriptions of *P. pinnata* and other species of the same genus *Paraprionospio* are all insufficient, that makes the immediate reliable comparison of the present forms with them impossible. Although the present four forms are distinct from each other in many respects, the specific assignments of them are left for future studies, reserving them as the forms of *Paraprionospio* presently.

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